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SCIENCE IN THE ELEMENTARY SCHOOL, GRADE 4, A GUIDE FOR TEACHERS.

BY- TAYLOR, MRS. JAMES L.
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A COURSE OF STUDY FOR SCIENCE IN THE FOURTH GRADE IS DESCRIBED. DIVISIONS ARE (1) AN INTRODUCTION WHICH PROVIDES A RATIONALE FOR THE GUIDE AND LISTS THE MAJOR CONCEPTS, (2) A SECTION WHICH LISTS THE SPECIFIC SCIENCE CONCEPTS FOR EACH LESSON AND GIVES THE SCOPE AND SEQUENCE FOR GRADES THREE TO SIX, AND (3) A SECTION WHICH PRESENTS FOUR TEACHING UNITS. THE UNITS ARE (1) ANIMALS, (2) SPACE AND EARTH SCIENCE, (3) PLANTS, AND (4) MATTER, ENERGY, AND MACHINES. INTERSPERSED IN THE UNITS ARE NINE LESSONS ON THE INTERRELATIONSHIP OF PLANTS AND ANIMALS WITH THEIR ENVIRONMENT. SPECIFIC CONCEPTS, OBJECTIVES, STUDENT EXPERIENCES, INSTRUCTIONAL MATERIALS, AND AUDIOVISUAL AIDS ARE LISTED FOR EACH LESSON. SOURCES OF INSTRUCTIONAL MATERIALS AND AUDIOVISUAL AIDS ARE PROVIDED. THE GUIDEBOOK WAS DESIGNED FOR USE WITH EDUCATIONAL TELEVISION BUT IS NOT LIMITED TO THIS USAGE. THE GUIDE IS ONE OF FOUR, THE OTHERS COVERING GRADES THREE, FIVE, AND SIX. (DS)

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SCIENCE IN THE ELEMENTARY SCHOOL

GRADE 4

A GUIDE FOR TEACHERS

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SCIENCE IN ELEMENTARY EDUCATION

GRADES 3-6

A GUIDE FOR TEACHERS

prepared by

MRS. JAMES L. TAYLOR

ETV SCIENCE TEACHER

TUPELO PUBLIC SCHOOLS

consultant

DR. J. DAVID MOHLER

DEPARTMENT OF EDUCATION

UNIVERSITY, MISSISSIPPI

illustrated by

MRS. MITZI MOORE

C. E. HOLLADAY, SUPERINTENDENT

TUPELO PUBLIC SCHOOLS

TUPELO, MISSISSIPPI

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FOREWARD

Science must be brought to the child at an early age because of the great scope of science and our dependence upon science as a way of life. The media through which this process will operate in conjunction with this Course of Study will be the television. As long as it remains accurate, sincere, and interesting, educational television will take its legitimate place as a tool for public education in science. Printed words and pictorial illustrations are the best means of carrying science to the public. With this Course of Study as a guide and educational television as a transmitter, it can develop the learner's enthusiasm in acquiring the necessary knowledge and skill to enable him to deal with his life and environment as our society requires in this world of today. The advantages of educational television instruction are obvious in science, as this subject lends itself well in explaining and showing the problems of science.

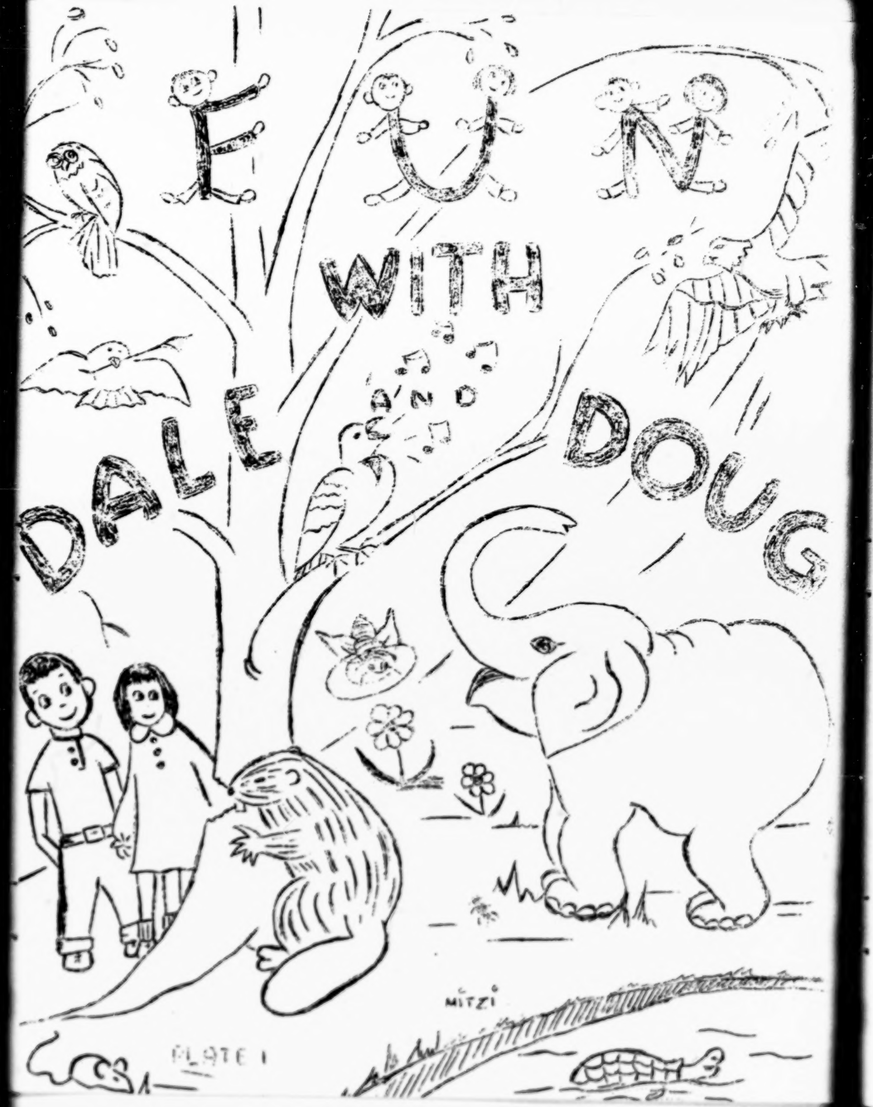
We wish to thank all of the elementary teachers, both from our faculty and the cooperating schools, who made outstanding contributions in the development of this course of study. Many have graciously given of their time and talents as this program was being prepared.

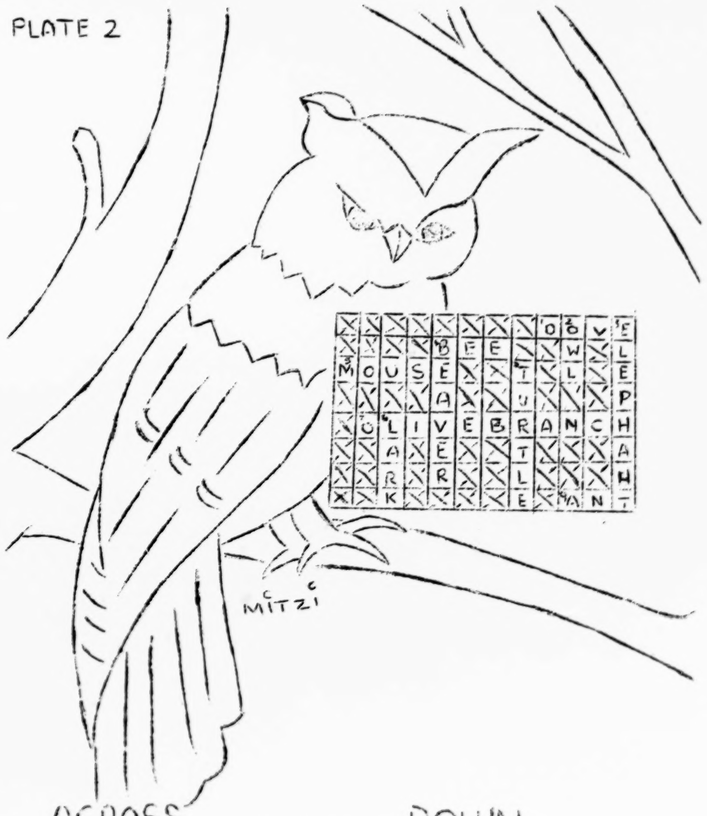
We are fortunate to have had the important supervision and outstanding assistance of Dr. Robert W. Plants and Dr. J. David

Mohler of the School of Education of the University of Mississippi.

This Course of Study should do much toward bringing direct simple answers to the many questions that arise as we work together in bringing to the children the experiences and the joys of discovery. We trust this will be helpful to you in your teacher-learning environment.

Mrs. James L. Taylor
Educational Television Science Teacher





ACROSS

1. BIRD OF PEACE
4. BUSY (S A) ____.
5 QUIET AS A ____
7. BRANCH THE DOVE CARRIES
9. INDUSTRIOUS AS AN ____

DOWN

2. WISE AS AN ____.
3. LONG REMEMBERING AS THE
4 AN EAGER ____.
6 HAPPY AS A ____.
8. DETERMINATION OF A ____

I

INTRODUCTION

Science is being scrutinized because of its advance in technology. Modern attitudes in science are going through radical changes. There is a definite movement for children to learn and infer from their own observations. The educational system must convey traditional knowledge and culture as well as emphasize inquisitiveness and mental flexibility to the younger generation. This will help to free them for more challenging work that requires visions that will be adaptable to the new and future ideas. The present knowledge we have of science serves as a guide and not as a goal for the students' studies.

Science is of great interest to children. "The problem is not one of creating interest in science, rather, science programs must be built so that both the pre-existing interest and its natural curiosity about science, are fostered and cultivated in children."[1]

Children build their own concepts regardless of the teaching they receive. This Course of Study is to guide them in their observations, clarify their present concepts, and help them build basically sound concepts.

---

[1]Harold E. Tannenbaum, Science Education for Elementary School Teachers, Boston: Allyn and Bacon, Inc., 1965, p. 55.

The children must develop in a logical sequence as they go through the grades. They must be aided in this gaining new concepts based on previously acquired knowledge along with their new learning experiences.

This guide breaks down the areas of learning into the living and the non-living. The living area is further divided into six lessons on animals and four lessons on plants. The non-living area is divided into space and earth science with six lessons, matter, energy, and machines with six lessons. There are nine lessons on interrelationship of animals and plants with their environment.

"Finally, there is the area of motivation through teacher interest. Here is the factor which, though most important, is most likely to be a stumbling block. Many teachers grew up in schools where science, if it was taught at all, was a sitting down, a reading, or a memorizing subject." The spark which, as children, they had for this area of learning was extinguished by sad school experiences. Teachers need to rekindle this spark in themselves. Only as they can develop a real interest in science can they nurture this interest in children."[2]

The student is not expected to grasp all of the factual material presented in the programs. The purpose of these programs

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[2] Ibid., p. 57-58

is to give an overview of the unity of all science and to develop an interest and curiosity on the part of the student in the things of science. It is relatively unimportant whether the student retains the majority of the details.

The purpose of this enrichment program is to introduce and broaden the basic aspects of science and the methods the scientists use. The biological and physical sciences are considered separately but are combined admirably in interrelated lessons. The living, biological science programs consider the animal for the fall study and the plant for the spring study. The fall is adaptable to studying animals while the spring time of year is especially adaptable to the study of plants. The earth sciences are studied during the winter to correlate noticeable weather changes, while matter, energy, and machines are adaptable any time of the year, so late spring was chosen.

It is not the intent of the course subject matter to duplicate the material found in the texts. It attempts to utilize the principles undertaken in the previous years and prepare a foundation for concept development in the forthcoming years.

All aspects of science are interrelated; a study of one field leads to an understanding of the others.

II

MAJOR CONCEPTS

A. Some things are living and some non-living.

1. Biology is the study of living things.
2. Zoology is the study of animals.
3. Botany is the study of plants.

B. To classify means to put in a group things that are alike in some way.

1. Living things are put together in one group because they have characteristics that set them apart from non-living things.
2. Living things are classified on the basis of structure in two large groups---plants and animals; these groups are divided into smaller groups; these in turn are divided into still smaller groups, and so on, down to individual species.
3. Some things on this earth are living and others are non-living.
4. Living things have special characteristics that separate them from the non-living.
5. Non-living things can be found to have some of the characteristics of the living.
6. Living things have a definite form and size.
7. Non-living things may be any size.
8. Living things have a definite length of life (except for disease and accident).
9. Living things are in a state of constant activity and depend upon a constant supply of vital energy to carry on their activities while non-living things are not in a state of constant activity and do not need a supply of energy.
10. All living things are either plants or animals.
11. Living things are able to move by themselves, take in oxygen or carbon dioxide from the air, use food, grow, reproduce like kind, and respond to stimuli.

C. All living things are made of cells.

1. Cells grow and divide.
2. Animals differ from plants in the structure of their cells.
3. Cells are grouped into tissues and tissues into organs.
4. Because of these organs all living things are called organisms.
5. The common activities of plants and animals are called life processes.

6. Plants have cell walls that make the plants stiff.
7. Animals have cell walls that make the animal flexible.

D. Most animals move about in search of food, shelter, and protection from their enemies.

1. Plants remain rooted in one place and must be equipped to withstand changes in temperature and to obtain their food.
2. All living things need oxygen but they get it in different ways; while green plants use carbon dioxide as well as oxygen.
3. Living things must have food, water, and warmth to stay alive.
4. Animals either eat plants or other animals for food.
5. Those plants that are green make their own food.
6. Some plants get their food from decaying plants and animals.
7. Living things have adaptations that help them to get the things that they need.

E. Living things grow from the inside while non-living things grow from the outside.

F. Living things have certain characteristics.

1. Living things grow by taking in food and making it a part of themselves.
2. Living things resemble their parents.
3. Plants and animals respond to outside influences in different ways.

G. Many things are non-living.

1. Rocks and minerals are non-living.
2. Wind moves but is not alive.
3. Machines move but are not alive.
4. Light and sound are forms of energy.

III

EXPERIENCES

A. Have the children tell the important differences in some living and non-living things they named.

B. Compare common animals and plants with other objects giving the differences between them.

C. Discuss the things that are necessary to stay alive.

D. Note when a living thing is no longer living as a tree being made into a table.

E. Illustrate that growth is a kind of movement by placing a plant so that its leaves are away from the light. After a few days note the direction of the leaves.

F. Note that the wind moves but that it lacks some of the other characteristics of the living.

G. Illustrate how the things that are needed are obtained by different adaptations.

H. Have the children breathe deeply then exercise and compare the number of times they breathe.

I. Observe the breathing of a fish in an aquarium.

J. Examine the stems of plants, such as cattails, to see the hollow stems through which air passes to the roots.

K. Ask the children to bring pictures of different animals. Discuss their food, their adaptations to get the food they need and the parts of their bodies that help them.

L. Illustrate how a green plant makes food by placing a plant in a dark place for a few days then placing it in the sunlight.

M. Show how green plants store excess food in roots (carrots, stems, potatoes) and leaves (lettuce).

N. Ask the students to trace the origin of one of the foods they had for breakfast.

O. Observe the cell of an animal and plant under the microscope.

P. Note the rolling snowball and the crystal growing. They lack some of the other characteristics of the living.

Q. Illustrate the manner in which some cells bring water to the leaves of the plant by placing a stalk of celery in water which has food coloring or ink added.

R. Show that all life depends upon the sun. Illustrate that a plant will die if it does not have sunlight and that all animals indirectly depend upon plants for food.

S. Let the children study the growth of a plant or reproduction by propagating plants by seeds, runners, cuttings, or leaves.

T. Study the resemblances of offsprings to parents by showing pictures.

U. Obtain frog's eggs, place in an aquarium, and watch the development until the tadpole emerges.

V. Examine a rock collection to decide if it is living or non-living.

W. Study simple machines to learn their characteristics.

X. Run experiments with light and sound to prove that they are not alive.

ANIMAL KINGDOM

TURTLE

CHORDATA

SPIDER

ARTHROPODA

SNAIL

MOLLUSCA

ANNELIDA

EARTHWORM

ECHINODERMATA

HOOKWORM

NEMATHELMINTHES

STARFISH

PLAYTHELMINTHES

TAPEWORM

COELENTERATA

JELLYFISH

PORIFERA

PROTOZOA

BATH SPONGE

MITZI

AMEBA

PLATE 3

PLANT KINGDOM

DAISY

ANGIOSPERMS

SPERMATOPHYTES

GYMNOSPERMS

CONIFER

FERNS

PTERIDOPHYTES

BRYOPHYTES

MOSSES

FUNGI

MUSHROOM

THALLOPHYTES

ALGAE

RED ALGAE

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PLATE 4

SCOPE AND SEQUENCE

WEEK	GRADE 3	GRADE 4	GRADE 5	GRADE 6
1	Introduction	Introduction	Introduction	Introduction
	UNIT I ANIMALS			
	GROUP	GROUP	GROUP	GROUP
2	10-man	9-insect	10-man	10-man
3	9-insect	10-man	9-insect	9-insect
4	9-Arachnids	9-Crustacea	9-Myriapoda	9-Insecta
5	1 and 2 one cell - two layer	3 and 6 prickly - spiny	4 and 5 flatworm - roundworm	7 and 8 sectionworm - Mollusk
6	10-birds	10-reptiles	10-amphibians	10-fish
7	10-mammals	10-mammals	10-mammals	10-mammals
8	10-pets	10-pets	interrelated	interrelated
9	interrelated	interrelated		

PLATE 5

UNIT
II
SPACE - EARTH

10	space-solar system	space-constellations	space-milky way	space-zodiac
11	space-moon	space-time	space-time	space-time
12	earth-weather	earth-watercycle	earth-precipitation	earth-winds
13	interrelated-safety	interrelated-safety	interrelated-safety	interrelated-safety
14	earth-dinosaurs	earth-changing	earth-rocks, minerals	earth-rocks
15	earth-lithosphere	earth-volcanoes	earth-earthquakes	earth-mountains
16	earth-ocean floor	earth-oceans	earth-ocean floor	earth-glaciers
17	interrelated-seashore	interrelated-desert	interrelated-ponds	interrelated-forests

UNIT
III*
PLANTS

18	1-simplest, non-green	1-simplest, non-green	1-non-green	1-non-green
19	1-simplest, green	2 - 2nd simplest, green	3-reproduction spores	4-flowering
20	4-function, seed	4-function, stem	4-evergreen	4-function, flower
21	4-function, root	4-special adaptation	4-function, leaf	interrelated-partners
22	interrelated-adaptation	interrelated-adaptation	interrelated-partners	interrelated-emergencies

*For the sake of simplicity the naming of the groups are not consistent as to phylum, class, or order.

PLATE 8

UNIT
IV
MATTER, ENERGY, MACHINES

23	matter-atom	matter-elements	matter-molecules	matter-water
24	poison	poison	no lesson	no lesson
25	science fair	science fair	matter-molecules	matter-changes
26	energy-magnets	energy-electricity	energy-electricity	energy
27	energy-electricity	energy-electricity	energy-electricity	energy-electricity
28	energy-light	energy-light	energy-light	energy-light
29	energy-sound	energy-sound	energy-sound	energy-sound
30	machines	machines	machines	machines
31	Mississippi	Mississippi	Mississippi	Mississippi
32	Evaluation	Evaluation	Evaluation	Evaluation

PART TWO

GRADE FOUR

© MITZI

CONCEPTS IN SCIENCE

PART TWO

GRADE FOUR

Introduction

General Concepts

Experiences

Lesson One
(Interrelated)

Concept: Living things have certain requirements they must fulfill.

UNIT ONE

LIVING THINGS

ANIMALS

Introduction

Major Concepts

Experiences

Lesson Two

Concept: The skin does many things.

Lesson Three

Concept: Arthropods differ from all other animals in the possession of hard protective body coverings and paired jointed legs.

Lesson Four

Concept: Many animals are adapted to living in the water.

Lesson Five

Concept: One group of animals is covered with scales.

Lesson Six

Concept: Mammals have specific characteristics.
Concept: The animals that are the highest in the class are the most highly developed.

Lesson Seven

Concept: Some animals make good pets.

Lesson Eight

Concept: Both animals and plants can live in a terrarium.

UNIT TWO

NON-LIVING THINGS

SPACE-EARTH

Introduction

Major Concepts

Experiences

Lesson Nine

Concept: The universe is composed of many bodies.

Lesson Ten

Concept: There are several ways to tell the time.

Lesson Eleven

Concept: The motion of the molecules determines the state of matter.

Lesson Twelve
(Interrelated)

Concept: Laws must be learned and observed.

Lesson Thirteen

Concept: Fossils are evidence of former life on earth.

Lesson Fourteen

Concept: Forces are at work which build up the surface of the earth.

Lesson Fifteen

Concept: Many animals live on the ocean floor.

Lesson Sixteen
(Interrelated)

Concept: In order to stay alive plants and animals must adapt to their environment.

UNIT THREE

LIVING THINGS

PLANTS

Introduction

Major Concepts

Experiences

Lesson Seventeen

Concept: Non-green plants do not contain chlorophyll and so they cannot manufacture their own food.

Lesson Eighteen

Concept: The first plants to live on both land and water developed during the Paleozoic Age.

Lesson Nineteen

Concept: Flowering plants have roots, stems, leaves, and flowers; each has a particular function.

Lesson Twenty

Concept: There are plants that are green and can manufacture their own food that have unique methods of securing their raw materials.

Lesson Twenty One
(Interrelated)

Concept: Plants and animals adapt to various environments in many ways.

UNIT FOUR

NON-LIVING THINGS

MATTER-ENERGY-MACHINES

Introduction

Major Concepts

Experiences

Lesson Twenty Two

Concept: Many elements have been discovered and were usually named for the discoverer.

Concept: The atom is a particle of matter.

Lesson Twenty Three
(Interrelated)

Concept: An understanding of materials can prevent many poison accidents.

Lesson Twenty Four
(Interrelated)

Concept: Every student who takes part in a group activity gains knowledge.

Lesson Twenty Five

Concept: Frictional electricity is the phenomenon produced when a body becomes electrically charged because of an excess or a deficiency of electrons.

Lesson Twenty Six

Concept: Electromagnets produce power in small amounts (door bell) or in great quantities (large motors).

Lesson Twenty Seven

Concept: Most colored objects are the color they appear to be because that is the color of light that they reflect.

Lesson Twenty Eight

Concept: There are many different kinds of sounds.

Lesson Twenty Nine

Concept: Simple machines of the inclined plane class are the wedge and the screw.

Lesson Thirty
(Interrelated)

Concept: The magnolia is the state flower of Mississippi.

Lesson Thirty One
(Interrelated)

Evaluation

LESSON ONE
(Interrelated)

The child must become aware that everything in his surroundings are either living or non-living. The students may find it difficult to accept the fact that there are similarities as well as differences in living and non-living things.

This lesson will emphasize the differences in the living and non-living. A list of some of the differences will be mentioned with examples to better illustrate these differences.

We hope to develop a sense of curiosity in the student concerning his environment and the many activities that are constantly going on around him. Familiar experiences should be called to the attention of the student. The more experiences for the children the better understanding they will have of the arrangement in this world of the living and the non-living.

I. CONCEPT:

Living things have certain requirements they must fulfill.

II. OBJECTIVES

A. To create a curiosity in the student concerning this world and the things in it.

B. To show that living things change.

C. To realise that non-living things do not grow and develop as living things.

D. To develop an awareness that living things come from other living things.

E. To show that there is a purpose for the things that animals do.

F. To help the children develop an awareness that everything on earth is changing, including themselves.

G. All living things are either plants or animals.

H. There are two main groups of animals, vertebrates and invertebrates.

I. Living things are grouped according to likenesses.

III. PROBLEM :

To distinguish the living from the non-living.

IV. INSTRUCTIONAL MATERIALS

A. Books

1. Exploring the Animal Kingdom, Millicent Selsam

2. How Things Grow, Herbert S. Zim

B. Films :

Living and Non-Living Things, Cor

C. Filmstrips

1. How Animals Are Grouped, YAF

2. Living Things, EBF

UNIT ONE

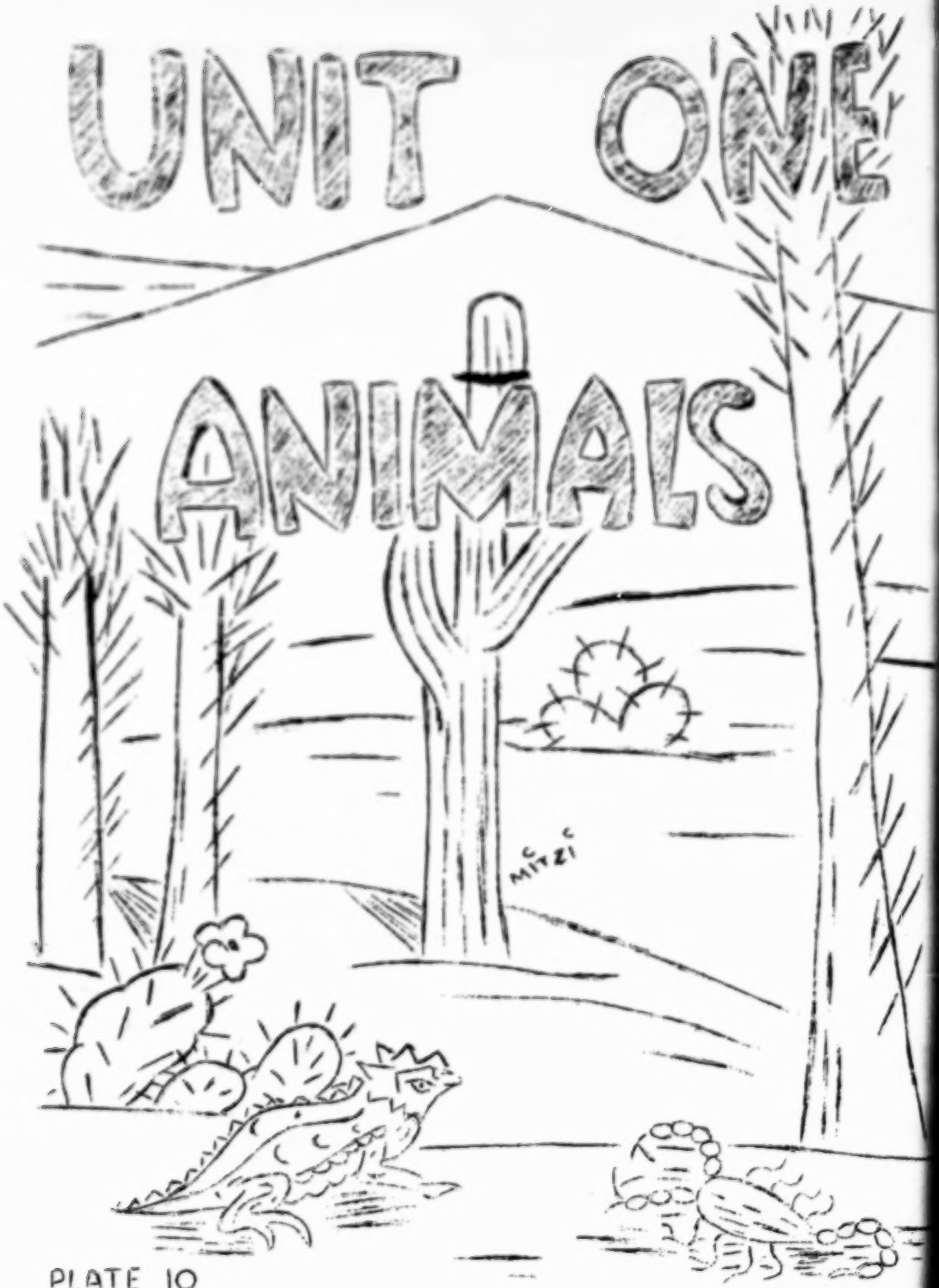

PLATE 10

UNIT ONE

LIVING THINGS

ANIMALS

I

Introduction

It is impossible to study animals alone. All living things can be grouped into two main categories; plants and animals. It is important that children learn that there are thousands of kinds of plants and animals, differeing only in size, appearance, and place of abode. Children will come to understand that there is an interchange of matter between living things and their environment. In this unit of study the principle of interdependence between plants, animals, and their environment is dealt with in the last lesson of the unit.

When the word animal is mentioned most of the children think of a four-footed fur bearing animal. Animals on this earth differ in size, shape and habitats. There are several ways in which all animals are alike. These animals are divided into two large groups; the vertebrates and the invertebrates. These in turn are divided into hard bodied and soft bodied animals. The simplest members of the animal group are the microscopic, one-celled protozoans. Although they are small, they do carry on the functions necessary for

life. This unit is designed to help the student to recognize the differences and likenesses among animals. While classifications are not a major purpose of the unit, children may be encouraged to observe certain characteristics that are typical of any one class. This unit is a follow up of the third grade using representative animals to acquaint the students with several different classifications.

II

Major Concepts

A. There are many kinds of living things.

   1. Animals vary in size, shape, coloring, covering, structure, and habitat.

   2. Animals are placed in groups with like characteristics.

B. The highest order of animals is the mammal.

   1. There are certain requirements for all animals to observe in order to survive.

   2. There are certain requirements of people in order to be accepted by others.

   3. Accepted habits are an aid to beauty and health.

C. Insects are egg laying animals that have no backbones.

   1. An insect passes through distinct forms as it grows from the egg.

   2. Adult insects have given characteristics.

   3. There are methods of collecting insects.

D. The structures of animals differ.

   1. Some animals do not have backbones.

   2. Some animals have hard coverings on the outside of their bodies.

   3. All animals need given things in order to survive.

   4. Many animals have a water environment.

E. Many different kinds of animals live in a water habitat.

1. Some water animals resemble plants.

2. Water animals have special adaptations to enable them to live in the water.

3. Many water animals do not look like the animals you know.

F. Animals are grouped according to their characteristics.

1. Structures of animals differ.

2. Animals must meet the requirements of life to live.

3. Some animals adapt to their environment by maintaining the temperature of the environment.

4. Animals live in different environments.

5. The reptiles that live in the water must come to the surface to breathe.

6. Some of the reptiles do not have limbs.

G. Mammals are one of the five groups of vertebrates.

1. Animals that have like characteristics are placed in the same group regardless of habitat.

2. Animals adapt themselves to their environment in different ways.

3. Organisms reproduce their own kind.

H. Some animals adapt themselves well as pets.

1. As natural as possible habitat must be maintained to live.

2. An understanding of the habits is necessary for a happy pet.

3. Some pets can be found in the out of doors.

4. Sometimes we have part-time pets.

I. Animals depend upon plants in many ways.

1. Some plants are eaten by animals.

2. Some plants help animals by providing shelter or protection.

3. Animals cannot make food for themselves. They must find food that was originally made by plants.

4. Animals which eat other animals are dependent upon plants for making the food.

5. Only plants can make food.

6. Plants are helped in many ways by animals.

7. People depend upon plants and animals for many things.

8. Plants and animals depend upon sunlight, moisture, air, and soil for good growth.

9. Plants and animals become adapted to conditions under which they live.

10. Some plants and animals are helpful to man, while others are harmful.

11. Light is essential to green plants.

12. Life in different sections of the earth varies.

13. Some plants and animals live in water; others live on dry land.

III

Experiences

A. Lesson two

1. Study concerning skin color.

2. Prepare a section of the skin under the microscope. This will reveal some of the skin structures.

3. Prepare a hair under the microscope and observe.

4. Draw and color a section of the skin.

5. Bring in as many modifications of the skin as you can.

6. Remember that a smile does much to make the face beautiful.

7. Discuss the dangers of leaving your skin and hair dirty.

B. Lesson three

1. Observe a crayfish, especially the stalk eyes and the movement of the mouth parts.

2. Have students make a list of crustaceans that we eat.

3. Discuss the differences in endoskeletons and exoskeletons.

C. Lesson four

1. Have the students make a bulletin board showing the life of the sea from the one-celled animals to the large whales.

2. Draw and discuss the "food chain of the sea."

3. Collect the shells of some sea animals. Point out their differences and likenesses.

D. Lesson five

1. Make a turtle home in a glass or pottery dish that has a flat bottom. Properly care for him, and observe his living habits.

2. Use a magnifying glass to count the main growth rings on one of the scales of a turtle's shell.

3. Lizards may well be kept in the classroom and observed.

E. Lesson six

1. Bring in pictures of mammals and their offspring to see that the young resemble the adult.

2. Discuss the types of parential care provided the young of certain animal groups.

3. Secure a hamster and observe it as to food, habits, etc.

4. Visit a zoo to observe the mammals.

F. Lesson seven

1. Secure a pet or observe the pet of a friend.

2. Prepare properly for your pet.

3. Provide the care that is necessary for the well-being of the pet.

4. Visit a pet shop.

5. Permit the students to discuss their pets.

6. Visit a local veterinarian.

G. Lesson eight

1. Prepare one or more of the terrariums for the classroom.

2. Set up two similar terrariums in jars. Seal them. Place one of the jars in a dark closet and the other in a sunny location. Observe them after a few days.

3. Place a thermometer in a terrarium. Cover and place in a sunny place. Notice how rapidly the air becomes heated.

LESSON TWO

I. CONCEPT:

The skin does many things.

II. OBJECTIVES

A. To better understand that the skin is a protective agent.

B. To be aware that there are layers in the skin.

C. To learn the functions of the skin.

D. To better understand how to give the skin the proper care.

E. To become aware that there are many modifications of the skin.

F. To be aware of the constant care needed for the skin and modifications.

G. To cause the student to become conscious of the need for daily personal care.

III. PROBLEM :

To learn to take proper care of the skin and hair.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. The Wonder World of Animals, Marie Neurath
2. How Your Body Works, Herman and Nina Schneider
3. All About the Human Body, Bernard Glemser
4. The Human Body, Ceril and Moriso Bibby
5. Wonders of the Human Body, Anthony Ravielli

B. Films
1. The Human Skin, Bray
2. The Human Hair, Bray
3. Body Care and Grooming, YAF

C. Filmstrips :
The Human Body, EBF

LESSON THREE

I. CONCEPT:

. Arthropods differ from all other animals in the possession of hard protective body coverings and paired jointed legs.

II. OBJECTIVES

A. To review some of the jointed-footed animals.

B. To understand how they are placed in the animal kingdom.

C. To study the life history of a representative crustacean.

D. To become aware of the importance of the crustaceans as a source of food for marine animals and several of the larger forms, on the other hand, as prized as human food.

III. PROBLEM:

To correlate the life history of one crustacean to all the others as a representative group meeting the needs to survive.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. Along the Shore, Millicent E. Selsam
2. Through the Sea, Millicent Selsam
3. Beneath the Sea, Arthur C. Clark
4. The Sea Around Us, Rachel Louise Carlson
5. Let's Go To the Seashore, H. E. Huntington

B. Films
1. Beach and Animals, EBF
2. Eyes Under Water, ALF
3. Life In the Sea, EBF
4. Low Tide on the Beach, CurrF
5. The Seashore, Barr

C. Filmstrips
1. Low Tide on the Beach, Curr F
2. American Seashores, YAF
3. Freshwater Shellfish and Amphibians, JH

LESSON FOUR

I. CONCEPT:

Many animals are adapted to living in the water.

II. OBJECTIVES

A. To develop an awareness that life in the sea varies from one-celled animals to huge whales.

B. To become aware of the fact that the invertebrates are represented by many water animals.

C. To develop an awareness that the jellyfish, sea anemone and the coral are widely different but belong to the same phylum, coelenterata (prickly).

D. To understand that the coral actually represents hundreds of tiny living animals.

E. To become familiar with the group of invertebrates, phylum echinodermata (spiny), whose skins are spiny and have organs of locomotion.

III. PROBLEM:

To learn more about the prickley and spiny animals of the seas.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. The Life of the Seashore, William Amos
2. The Ocean World, Vladimir and Nada Kovalik
3. Exploring Under the Sea, Sam Hinton
4. All About the Sea, Ferdinand Cole Lane

B. Films
1. Plants and Strange Animals of the Sea, JH
2. Water, Water Everywhere, YAF

C. Filmstrips
1. Seashore Life, EBF
2. We Visit the Seashore, YAF

LESSON FIVE

I. CONCEPT:

One group of animals is covered with scales.

II. OBJECTIVES

A. To learn of the animals that have the body covered with scales.

B. To better understand that animals differ in size and appearance and still belong to the same group.

C. To learn that some of the animals of one group may live in water and other members of the group may live on land.

D. To be aware that all animals have given characteristics that place them in a given group.

E. To better understand one of the five groups of vertebrates.

F. To develop an awareness that all animals perform given life functions.

G. To become aware of the fact that some animals reproduce their own kind through eggs laid externally.

III. PROBLEM:

To learn of one animal that lays soft leathery eggs on land and uses lungs to breathe air from the atmosphere.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. Turtles, Wilfred S. Bronson
2. What's Inside of Animals, Herbert S. Zim
3. Snakes, Herbert S. Zim
4. The True Book of Reptiles, Lois Ballard
5. First Book of Snakes, John Hoke
6. Turtles, Lois and Louis Darling

B. Films
   1. Fresh Water Turtles and Fish, JH
   2. Snapping Turtles, EBF
   3. Let's Catch Reptiles, IF
   4. Snakes Can Be Interesting, YAF
   5. Reptiles, EBF
   6. Reptiles are Interesting, FAC
   7. American Reptiles and Amphibians, YAF

C. Filmstrips
   1. Freshwater Turtles and Fish, JH
   2. Reptile Set, SVE
   3. Snakes and Lizards, You Should Know, SVE
   4. The Turtles, Curr F
   5. Learning About Reptiles, EBF
   6. Snakes, Helpful and Harmful, JH

LESSON SIX

I. CONCEPT :

Mammals have specific characteristics.

II. OBJECTIVES

A. To learn that mammals bear their young alive.

B. To observe that the offspring of mammals resemble the adult.

C. To realize that the life activities of mammals must continue if they are to survive.

D. To become aware of some of the ways that mammals adapt to their environment.

E. To investigate the various environments of mammals.

F. To better understand that mammals are one of the five groups of vertebrates.

III. PROBLEM:

To learn about the animals that have hoofs.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. The First Book of Mammals, Margaret Williamson
2. Goats, Wilfred S. Bronson
3. The Wonder World of Animals, Marie Neurath
4. Here Comes the Lions, Alice E. Goudy
5. The Biggest Bear on Earth, Harold McCracken
6. Exploring the Animal Kingdom, Millicent Selsam

B. Films
1. Animals and Their Foods, Cor
2. Wonders in Your Own Backyard, Cor
3. The Bear and Its Relatives, Cor
4. Animals - Ways They Move, EBF

C. Filmstrips:
Mammal Set, SVE

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5. The Biggest Bear on Earth, Harold McCracken
6. Exploring the Animal Kingdom, Millicent Selsam

B. Films
1. Animals and Their Foods, Cor
2. Wonders in Your Own Backyard, Cor
3. The Bear and Its Relatives, Cor
4. Animals - Ways They Move, EBF

C. Filmstrips:
Mammal Set, SVE

LESSON SEVEN

I. CONCEPT:

Some animals make good pets.

II. OBJECTIVES

A. To learn which animals are usually used for pets.

B. To enable the student to learn the proper care of some pets.

C. To encourage love and care for animals.

D. To permit the child to learn responsibility in caring for an animal.

III. PROBLEM:

To learn to care for your pet properly.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. A Pet Book, Barton
2. Pets, Francis Chrystie
3. The Pet Show, Glenn Bloush
4. My Own Little Cat, Gerland Ekeroth
5. The True Book Library, Illa Podendorf
6. The Pet Club Masters, Katherine Masters

B. Films
1. Care of Pets, EBF
2. Corky the Crow, EBF
3. Tippy - the Town Dog, EBF
4. Three Little Kittens, EBF

C. Filmstrips
1. Too Many Pets, Curr F
2. Bob's Goldfish, Curr F
3. Whitey's Big Day, Curr F
4. Pet Parade, Curr F
5. Farm Pets, Curr F

LESSON EIGHT
(Interrelated)

I. CONCEPT:

Both animals and plants can live in a terrarium.

II. OBJECTIVES

A. To cause a terrarium of some description to be in each classroom.

B. To cause the students to become interested in at least one kind of terrarium.

C. To make it possible for the students to understand how to prepare a terrarium.

D. To provide information for the student to capably select plants and to catch the terrarium's population.

E. To cause the students to learn to care for the plants and animals of the terrarium.

F. To cause an awareness for the opportunities available for observation and experimentation with a terrarium.

G. To bring about a more complete understanding of the interrelationship of plants and animals.

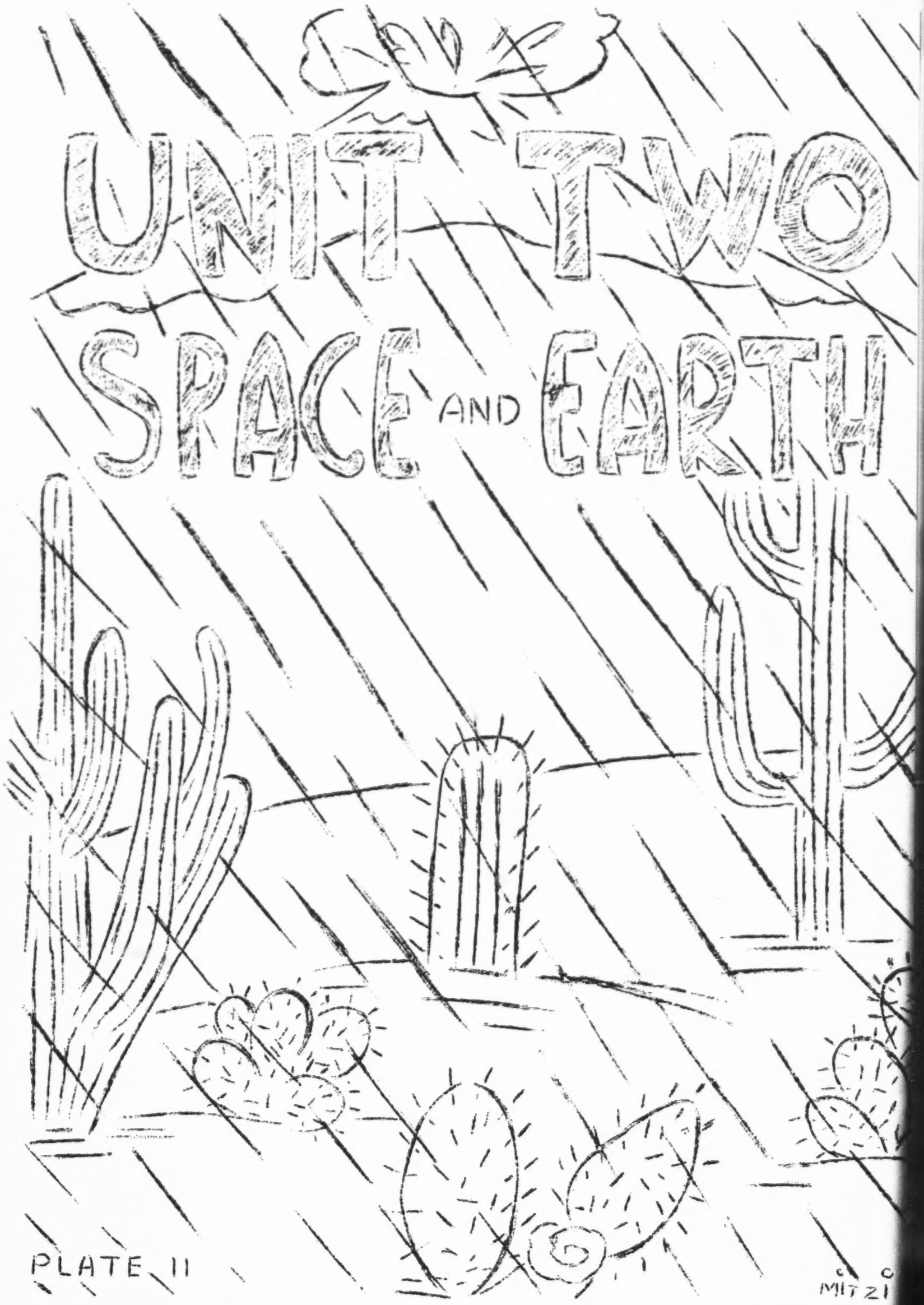
III. PROBLEM:

To make it possible for the students to see a terrarium.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. The Adventure Book of Underwater Life, Carlton Ray
2. The Underwater Zoo, Theodore McClintock
3. The Pond World, C. H. Lawrence and Esther Bjoland

B. Filmstrips
1. Desert Plants and Animals, Curr F
2. How Animals Live in the Desert, Curr F
3. Reptiles of the Desert, EBF
4. Plant Life of the Desert, EBF


UNIT TWO
SPACE AND EARTH
PLATE II
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UNIT TWO

NON-LIVING THINGS

SPACE-EARTH

I

Introduction

When we study the earth sciences, we learn that children gain an awareness, through evidence presented, that living things have changed as changes have taken place upon the earth. These changes are still going on and we study these changes as we study the formation of caves, the work of water on the earth, and other influences. The evidence of past times is the remains that we find in the earth. From this, information is gathered and pieced together to form a history of the earth.

We consider our neighbors in space and their influences upon our lives. Some of these changes occur daily, some are experienced seasonally, while some extend over a lifetime. Some changes are so gradual that they are apparent only from evidence left behind for millions of years. This section is designed to increase a child's understanding of the changes he can see from day to day, and the evidences he can see of changes that have occured over long periods of time. It is also designed to increase the student's realization that our earth is a part of a greater organization, the universe.

II

Major Concepts

A. Life in the past is pieced together from the fossils found.

   1. The earth is very old.

   2. The story of the earth may be seen in the rocks.

   3. A Paleontalogist is one who studies fossils.

B. The earth's surface is being constantly changed.

   1. Scientists studied the interior of the earth during the IGY.

   2. Toward the center of the earth the material is heavier and hotter.

   3. Natural forces are constantly wearing down and building up the earth's surface.

C. The water cycle is always functioning.

   1. Evaporation and condensation are changes in the state of matter.

   2. Clouds and precipitation are the results of condensation and evaporation.

   3. When energy changes from one form to another there is no change in the amount of energy envolved.

D. We must eliminate as many hazards as possible.

   1. Laws must be learned and followed.

   2. Laws are made to protect the individual.

   3. Law enforcement officers are to preserve the laws.

E. The universe and the parts that go to make it up are constantly changing.

   1. The bodies that make up the universe are in constant motion.

2. The solar system is made up of the sun and all the objects that move around it.

3. Planets are different from the stars.

4. The position of the stars do not change in relationship to each other.

5. The magnitude of the stars vary.

6. Some groups of stars are called constellations.

F. The heavenly bodies move in an orderly fashion.

1. The earth moves in two directions.

2. Different heavenly bodies have been used as timekeepers.

G. Living things live throughout the world under many environmental conditions.

1. Most every environment has some plants and animals adapted to the environment.

2. The differences in animals help keep them alive.

3. Many animals have color adaptations that aid them in escaping from their enemies.

4. Animals and plants from each environment differ from animals and plants in many other environments.

5. Some animals have to have special protection from the heat and cold.

6. The many conditions under which animals must live require that the animals themselves must be different.

H. Living things that are alike in important ways are put into the same group.

1. Living things grow and develop in different environments.

2. Marine animals have special adaptations to their environments.

3. Animals and plants must meet the life processes if life is to continue.

III

Experiences

A. Lesson nine

1. Make a tin can star finder and use it.

2. Look up the stories that are connected with groups of stars.

3. Make star charts.

4. Make a moon map.

B. Lesson ten

1. Make a sundial that will tell the time where you live.

2. Keep a chart telling the exact time of sunrise and sunset.

3. Make a perpetual calendar.

4. Make models of timekeepers.

C. Lesson eleven

1. Encourage the children to experiment with the evaporation of water as related to the amount of heat used.

2. Experiment to produce a cloud in a widemouth gallon jug.

3. Observe your terrarium to see if it rains in it.

4. Observe snow flakes with a magnifying glass.

D. Lesson twelve

1. Ask the children to locate the fire extinguisher in the building.

2. Draw up a set of safety measures for the schoolroom.

3. Draw up a set of rules for safety over the holidays.

E. Lesson thirteen

1. Draw a line graph of the age of the earth.

2. Make a print of a leaf, rock, shell, footprint, etc., using mud or plaster of paris.

3. Arrange a few fossils to be displayed in the classroom.

4. Use a magnifying glass to secure a closer examination of a fossil.

5. Have the pupils find out where in their community fossils have been found.

6. Ask the pupils to read the story of the tar pits of California.

7. Have the pupils find out what methods are used by scientists to determine the age of the earth.

8. Have the pupils make pictures of the main forms of life in the eras.

9. Take a field trip to look for fossils.

F. Lesson fourteen

1. Have pupils build a model volcano. Label the crater and lava flows.

2. Ask the students to report on old volcanoes.

3. Illustrate the different kinds of volcanoes.

4. Locate volcanoes on a world map.

5. Make a list of the islands formed by volcanoes.

6.Discuss other things that change the earth.

G. Lesson fifteen

1. Have students make a display of sea shells.

2. List adaptations necessary of underwater life.

3. List likenesses and unlikenesses of animals with soft bodies and hard shells.

H. Lesson sixteen

1. Prepare gardens to illustrate various environments.

2. Observe the relationships between the animals and plants in the different environments.

3. Observe the living habits of a snail in the aquarium.

LESSON NINE

I. CONCEPT :

The universe is composed of many bodies.

II. OBJECTIVES

A. To give a better understanding to the student of the motions and parts that make up the universe.

B. To cause the student to develop some conception of the vastness of space.

C. To be able to distinguish a star from a planet.

D. To learn the location of some of the constellations.

E. To be aware that stars have given characteristics that separate them from other bodies.

III. PROBLEM:

To learn to name some of the heavenly bodies.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. The Adventure Book of Stars, Thomas Nicholson
2. The Big Dipper, Franklyn Branley
3. Exploring the Sun, Roy A. Gallant
4. Find the Constellations, Hans A. Ray
5. The Sun, Herbert S. Zim
6. You Among the Stars, William Scott
7. Point to the Stars, Joseph M. Joseph
8. Stars, Herbert S. Zim

B. Films
1. Exploring the Night Sky, EBF
2. This is the Moon, YAF
3. Stars in the Sky, EGF

4. What Do We See in the Sky?, Cor
5. The Sun's Family, YAF

C. Filmstrips
1. The Sky Above Our Earth, SVE
2. What Is in the Sky?, Curr F
3. The Story of the Universe, UW-Educ
4. Constellations, SVE

LESSON TEN

I. CONCEPT:

There are several ways to tell the time.

II. OBJECTIVES

A. To familiarize the student with the history of time pieces.

B. To cause an awareness of the accuracy of the movement of the heavenly bodies.

C. To add to the knowledge of the heavens and the movements thereof.

D. To better understand some of the timekeepers.

III. PROBLEM:

To learn to tell the time from the heavens.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. The Clock We Live On, Isaac Asimov
2. Worlds in the Sky, Carroll Fenton and Mildred Fenton

B. Films:
Constellations, Guides to the Night Sky, Indiana University

C. Filmstrips
1. Fun with Stars, YAF
2. The Stars, YAF

LESSON ELEVEN

I. CONCEPT:

The motion of the molecules determines the state of matter.

II. OBJECTIVES

A. To cause the student to understand that evaporation results when molecules gain enough energy to move apart from one another.

B. To cause an awareness that the cycle of evaporation and condensation is a result of heat exchange. Molecules move farther apart when heat energy is supplied and move closer together when heat energy is taken away.

C. To realize that warm air expands and cool air contracts.

D. To form the habit of observing the weather changes and the reasons for the changes.

III. PROBLEM:

To learn why the water cycle continues.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. Weather, Paul E. Lehr
2. Our Changing Weather, Carroll and Mildred Fenton
3. Everybody's Weather, Joseph Gaer
4. Everyday Weather and How It Works, Herman Schneider
5. All About the Weather, Ivan Ray Tannenhill
6. Not Only for Ducks, Glenn Blough

B. Films
1. Water in the Air, IF
2. Water Cycle, EBF
3. Clouds, ALF
4. Clouds, Rain and Snow, SVE
5. What Makes Rain?, YAF

C. Filmstrips

1. Climate, YAF
2. The Muddy Raindrop, SVE
3. Weather, YAF
4. How Does Water Get Into the Air?, JH
5. What Makes Things Dry Faster, JH
6. Where Do Clouds Come From?, JH
7. What Makes Rain, YAF

LESSON TWELVE
(Interrelated)

I. CONCEPT :

Laws must be learned and observed.

II. OBJECTIVES

A. To acquaint the students with the necessity of knowing the laws and observing them.

B. To cause the student to become aware of the fact that the law is for his good.

C. To create a friendly feeling toward the law enforcing officers.

III. PROBLEM :

To learn some safety precautions we should observe.

IV. INSTRUCTIONAL MATERIALS

A. Books :
Watch Your Step, J. J. Foherty

B. Films
1. Fire, EBF
2. Growing Up Safely, Mississippi State Board of Health
3. Home Accidents Hazards, Mississippi State Board of Health

LESSON THIRTEEN

I. CONCEPT:

Fossils are evidence of former life on earth.

II. OBJECTIVES

A. To gain a conception of the age of the earth.

B. To become aware of some of the evidence of life on the earth long ago.

C. To interpret the evidence found of plants and animals that lived long ago.

D. To be introduced to the divisions of time geologically.

E. To develop a desire to learn from the evidence found of the nature of life long ago.

III. PROBLEM:

To learn of evidence which will cause us to learn of the plants and animals that lived long ago.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. The Story of Caves, Dorothy Sterling
2. The First Book of Stones, M. B. Cormick
3. Rocks and Their Stories, Carroll and Mildred Fenton
4. Horses and Their Ancestors, William Burns

B. Filmstrips
1. Animals of Long Ago, Curr F
2. The Story Fossils Tell, EBF
3. The Story of the Earth We Find in Rocks, JH
4. The Story of Underground Water, EBF

LESSON FOURTEEN

I. CONCEPT:

Forces are at work which build up the surface of the earth.

II. OBJECTIVES

A. To become aware that a volcano builds up the surface of the earth by transporting materials from the interior of the earth to the surface.

B. To learn that there have been active volcanoes in the United States.

C. To develop an awareness that volcanoes are still in the making.

D. To familiarize the students with the fact that all volcanoes are alike in many ways.

E. To create a desire to study further into the makings of a volcano.

III. PROBLEM:

To learn some ways that the surface of the earth is built up.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. Rocks, Rivers, and the Changing Earth, Herman and Nina Schneider
2. A Child's Book of Mountains and Volcanoes, Hames Medler
3. Rocks and Their Stories, Carroll and Mildred Fenton
4. Volcanoes, New and Old, Satid Coleman
5. Volcano, Tom Galt

B. Films
1. Volcanoes in Action, EDF
2. Paracutin - Mountain of Fire, Pictorial

C. Filmstrips
1. The Story of Volcanoes, EDF
2. Rocks and How They Change, FH

LESSON FIFTEEN
(Interrelated)

I. CONCEPT:

Many animals live on the ocean floor.

II. OBJECTIVES

A. To learn some of the necessary adaptations to live in a water environment.

B. To develop an awareness of the relationship of animals with soft bodies and hard shells.

C. To observe the likenesses and unlikenesses of animals with soft bodies and hard shells.

D. To become aware of the adaptations to be met in a water environment.

E. To better understand the relationship of plants and animals in a water environment.

F. To follow the life history of sea animals.

III. PROBLEM:

To learn some of the life problems of the animals that live in shells in the sea.

IV. INSTRUCTIONAL MATERIALS

A. Books

1. The First Book of Sea Shells, Betty Cavanna
2. See Through the Lake, Millicent Selsam
3. See Through the Sea, Millicent Selsam
4. The First Five Fathoms, Arthur Clark
5. Undersea Explorer, The Story of Captain Cousteau, James Dugan
6. The How and Why Wonder Book of Sea Shells, Conald Low

B. Films
   1. Marine Life, EBF
   2. The Fresh Water Pond, EBF
   3. Land and Waters of Our Earth, Cor
   4. Shellfish of the Seashore, JH

C. Filmstrips
   1. Let's Explore a Pond, SVE
   2. Wealth in the Ocean, Moody

LESSON SIXTEEN
(Interrelated)

I. CONCEPT:

In order to stay alive plants and animals must adapt to their environment.

II. OBJECTIVES

A. To interest the student in the various environments with the special adaptations necessary to survive by illustrating one situation.

B. To cause the student to understand the reasons for given adaptations.

C. To cause the student to understand better the relationship of animals and plants to each other and to the habitat.

D. To give a wider understanding of the overall balance of nature.

III. PROBLEM:

To learn some of the problems of living in a desert, a woodland or a water environment.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. Let's Go To the Desert, Harriet Huntington
2. Deserts, Delia Goeta
3. All About the Desert, Sam and Beryl Epstein
4. This is the Desert, Phil Ault
5. Elf Owl, Mary and Conrad Buff
6. Horned Lizards, M. Vere DeVault and Theodore Munch
7. Wild Folk in the Desert, Carroll Fenton and Evelyn Carswell

B. Films:
The Desert Story, Walt Disney

2. What Makes a Desert?, YAF
3. Wild Life on the Desert, California University
4. Land of Little Water, EBF
5. Life in the Desert, EBF
6. Wonders in the Desert, CW
7. Animals and Their Foods, Cor

C. Filmstrips:
Miniature Plants in the Desert

UNIT THREE

PLANTS

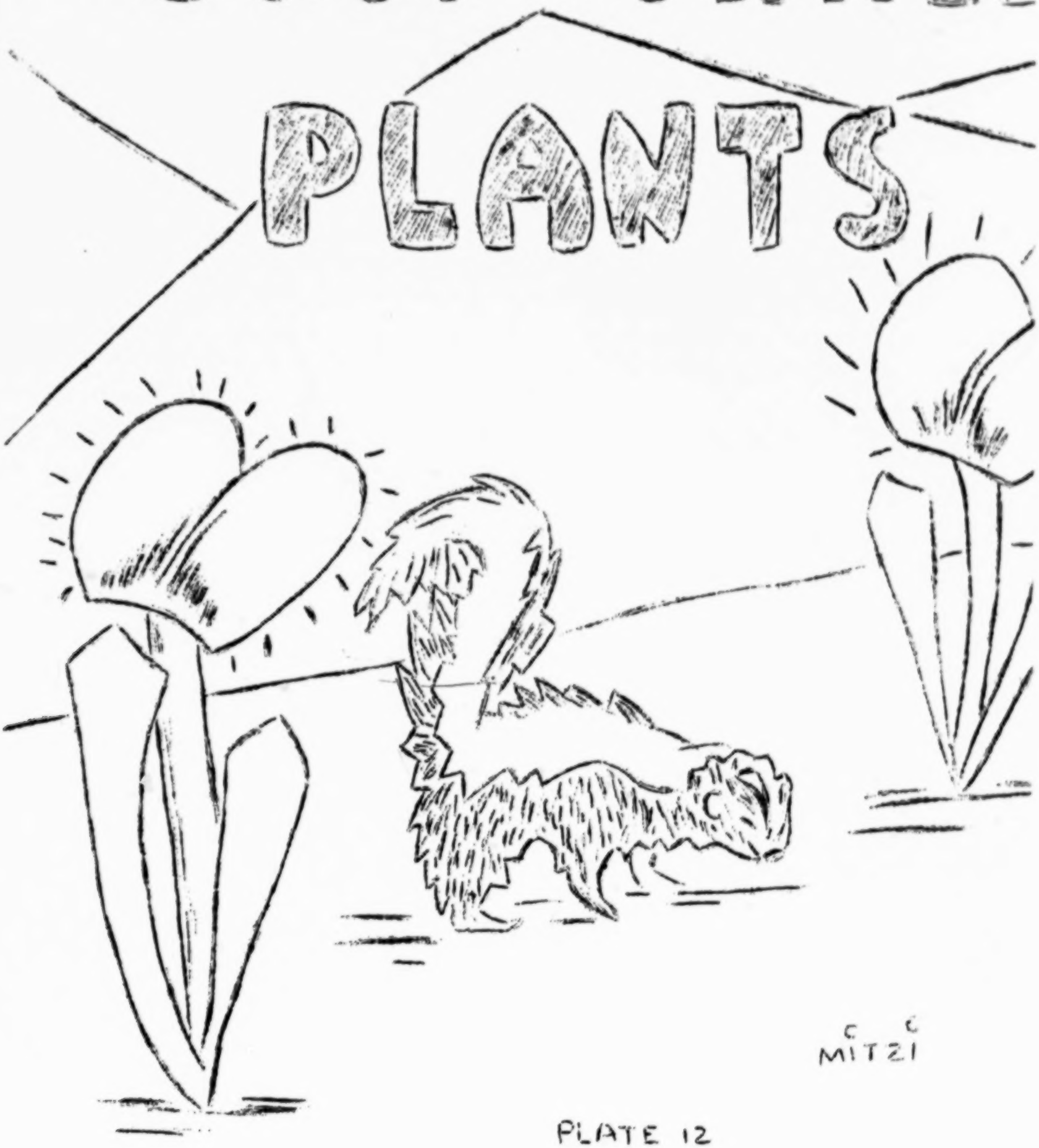

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PLATE 12

UNIT THREE

LIVING THINGS

PLANTS

I

Introduction

Children are fascinated by plants growing, particularly from seeds. In this unit the children will have an opportunity to discover many things about living organisms. The beginning of this unit on plants tells of the unity of the many living organisms in a desert environment. As a good setting for the beginning study of plants, this introduces the plant life.

The children discover the basis of classification of plants. They look at the classification of the simplest plants, yeasts, to the complex plants. They realize the basis of classification depends on the various structures the plants have. In the third grade the simplest plants, algae, were studied. The child can build upon the knowledge acquired in the previous study. The pupils will notice that as the plants become more complex, the method of reproduction becomes more complex. The children have many opportunities to collect and to grow their own plant specimens for examination. The plant

classes the children study in this unit extend from the fungi to the most complex plants. Following the work of the third grade on the functions of the roots, we now study the functions of the stems; and we close the study with usual adaptations as well as unique adaptations for meeting the needs of life. We hope to motivate the students to find out more about plants. Through the many experiences with growing plants, the children will discover some of the basic patterns found among all living things. As we progress through the unit, this will increase and deepen their awareness of these patterns. Through these experiences they will develop good habits of observation and desirable techniques for setting up their own investigations as they develop an understanding of the plants.

II

Major Concepts

A. Scientists who study plants are Botanists.

1. In classifying plants, scientists group together those plants that are constructed in similar ways.

2. Green plants make their own food, but many other types do not.

3. Fungi, the simplest of plants depends on other living things for food; they have no roots, stems, leaves, or seeds.

4. Bacteria, yeast plants, rusts, molds and mushrooms are fungi.

5. The fungi do not make their own food.

6. The fungi and bacteria are very important to us. If they did not cause substances to be returned to the soil, green plants would not be able to grow. We depend upon green plants for food.

7. Yeast plants are helpful to man.

8. Some plants have true roots, stems, and leaves.

9. Land plants that died in swamps slowly turned to coal.

10. Plants differ in many ways.

11. Some plants reproduce from seeds, while others reproduce from spores.

12. Animals eat plants since green plants are the only things that can manufacture food.

B. Many of the adaptations of plants are for protection from the elements or animals.

1. Each part of the plant has some function; different parts of different plants are used for food.

2. Plants store food in different parts of the plant and also furnish food for man.

III

Experiences

A. Lesson Seventeen

1. Take the students on a field trip to identify the fungi in your region. Record the observations as to place and conditions where found.

2. Grow yeast plants in a warm place with moisture and sugar for food.

3. Observe the life cycle of the yeast under a magnifying glass.

4. Make a display of the things in our lives for which yeast is responsible.

B. Lesson Eighteen

1. Take the students on a field trip to a local nursery, greenhouse, or botanical garden. Note the variety of plants.

2. Bring in some moss.

3. Take the class on a nature walk. Notice the mosses.

4. Have a pupil find out on which side of a tree moss grows. Why?

5. Scrape some moss off a tree and examine it with a magnifying glass.

6. Plant moss in your terrarium.

C. Lesson Nineteen

1. Ask the students to find information on the life and work of Carolus Linnaeus.

2. Place a piece of celery in a jar of water. Color the water with red ink. Pupils will observe that the red appears in the stem and leaves as the stems conduct water from roots.

3. Have children collect samples of food they eat from different plants.

4. Take the students on a field trip to a vegetable market. See if they can recognize the different parts of the plant the vegetable came from.

D. Lesson Twenty

1. Bring in plants to the classroom that have special methods of securing food.

2. Take a field trip and observe the many adaptations that plants have.

E. Lesson Twenty-One

1. Organize the defenses of plants into groups and display them.

2. Obtain catalogues from nurseries and study the differences in plants.

3.Permit the students to look closely at all the plants in the room and discuss their differences.

LESSON SEVENTEEN

I. CONCEPT:

Non-green plants do not contain chlorophyll and so cannot manufacture their own food.

II. OBJECTIVES

A. To understand the grouping of the fungi.

B. To become aware of the differences in non-green and green plants.

C. To study the life history of one fungi.

D. To realize the relationship of fungi to our daily lives.

III. PROBLEM:

To learn how we are dependent upon the fungi.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. Microbes at Work, Millicent Selsam
2. The First Book of Plants, Alice Dickenson
3. The Plant World, Illa Podendorf and Bertha M. Parker
4. The Story of Mosses, Ferns, and Mushrooms, Dorothy Sterling
5. True Book of Bacteria, Anne Frahm

B. Films
1. Plants Make Food, CW
2. What Plants Need for Growth, EBF
3. Simple Plants, Bacteria, Cor
4. Simple Plants, Algae and Fungi, Cor
5. Life in a Cubic Foot of Air, Cor
6. Molds and Yeast, EBF
7. Budding Yeast, Society of American Bacteriologist

C. Filmstrips
1. Dependent Plants, SVE
2. How Plants Help Man, YAF
3. Plant Needs, EBF

LESSON EIGHTEEN

I. CONCEPT:

The first plants to live on both land and water developed during the Paleozoic Era.

II. OBJECTIVES

A. To better understand how plants may be classified.

B. To see a connection between the mosses now and the ones long ago.

C. To create an interest in the plants without true roots, stems, and leaves.

D. To learn of the life history of the mosses and horsetails.

E. To cause the students to become aware of the life all around them.

III. PROBLEM:

To learn about two plants that could be called living fossils.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. The First Book of Plants, Alice Dickerson
2. The Golden Treasury of Natural History, Bertha Parker

B. Films:
Life on a Dead Tree, FAC

C. Filmstrips:
Learning About Plants, EDF

LESSON NINETEEN

I. CONCEPT:

Flowering plants have roots, stems, leaves, and flowers; each has a particular function.

II. OBJECTIVES

A. To find the purpose of the stem.

B. To become aware of the activity that goes on within the stems of plants.

C. To develop an awareness of the fact that food is stored in the stems of some plants, in other parts of other plants.

D. To develop an interest and curiosity in the life processes of plants.

E. To study the secrets of the plants manufacturing food.

F. To learn the many stems we use for food.

G. To better realize the important part plants play in our lives.

III. PROBLEM:

To find out the purpose of the stem of plants.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. The True Book of Trees, Illa Podendorf
2. The True Book of Weeds and Wild Flowers, Illa Podendorf
3. What's Inside Plants, Herbert Zim

B. Films
1. Life of a Plant, EBF
2. Clothing, EBF
3. How Plants Help Us, Cor

C. Filmstrips
1. Green Plants, EBF
2. How a Plant Makes Food, YAF

LESSON TWENTY

I. CONCEPT:

There are plants that are green and can manufacture their food that have unique methods of securing their raw materials.

II. OBJECTIVES

A. To introduce the students to unique methods that some plants have of solving the problems confronting them concerning air, water, and raw materials.

B. To cause an awareness in the student of the many ways that plants are arranged to fit into their environment.

C. To permit the students to understand that plants are alike in many ways but are different in many ways.

D. To create an interest in plant life.

E. To learn the uses of plants to man.

III. PROBLEM:

To know some plants that have unusual ways of solving their problems of life.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. The First Book of Plants, Alice Dickenson
2. More Experiments in Science, Nelson Beeler and Frank Branley
3. A Book of Nature, Pelagie Doane
4. Plants in the City, Herman and Nina Schneider

B. Films
1. Life of a Plant, EBF
2. Seasonal Changes in Trees, Cor
3. Partnerships Among Plants and Animals, Cor

C. Filmstrips
1. Trees, the Oldest and Largest Living Things, PDP
2. How Trees Grow, PDP

LESSON TWENTY ONE
(Interrelated)

I. CONCEPT:

Plants and animals adapt to various environments in many ways.

II. OBJECTIVES

A. To develop the habit of observing and enjoying the differences in plants.

B. To learn how plants have adapted to a wide variety of situations.

C. To learn how animals have adapted to a wide variety of situations.

D. To create curiosity and interest concerning plants and animals.

III. PROBLEM:

To find out exactly how some plants have adapted to their environment.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. Protection in Nature, Caynelle Davie
2. The Wonderland of Plants, Terry Shannon
3. Plants, Herbert Zim
4. Plants That Move, Millicent Selsam

B. Films
1. How Plants Grow, Cor
2. Planting Our Garden, Cor
3. How Plants Help Us, YAF

C. Filmstrips
1. How Plants Start Growing, EBF
2. How Animals Protect Themselves, SVE
3. Green Plants Are Important To Us, JH
4. What Do Green Plants Need for Growth, JH
5. Animal Protections, CurrF

UNIT FOUR

MATTER, ENERGY, MACHINES

UNIT FOUR

NON-LIVING THINGS

MATTER, MACHINES, ENERGY

I

Introduction

The first section of this unit discusses matter - what it is, how it can be described, its various states and the smallest particles. The unit begins with the smallest division of matter, the atom; beginning with the simplest and moving to the more complicated unit of matter will give the student something to base his ideas on when assigned more difficult tasks.

National poison week warrants one lesson. This will be time well spent if we can cause someone to learn that caution and safety measures must be observed when poisonous substances are considered.

Many of the students have shown unusual ability in preparing a science exhibit. This time is alloted for all those who will participate in the program. It will give the student recognition for his superior work and will share his knowledge with many others.

We follow the lesson on the smallest particle of matter, the atom, with a study of energy. Electricity, being one form of energy,

lends itself well to be studied as a follow-up to the study of the atom. Here static electricity is considered, followed by the study of current electricity. Students always find the study of magnetism, static electricity, and current electricity exciting. This is useful in understanding their many uses in the homes and the surroundings of the students.

Energy causes work to be done. The simple machines must be thoroughly understood to form good foundations on which the children may later learn. The third grade began the study of simple machines and this year the study is explained by giving careful attention to the inclined plane and its uses.

Other forms of energy than electrical are light and sound. The third grades studied these. A further study in these fields is again undertaken but different aspects are considered. With the study of light the emphasis will be upon colors while in the study of sound, frequency will be considered.

As we close the work for the year, what could be better suited to end with than the Mississippi State Flower? This unifies the work for the year by studying a plant, the magnolia. The study of plants goes into all fields of science - these things combined give us our lovely magnolia flower. This gives us pride and joy in our wonderful state of Mississippi.

An evaluation lesson concludes the program for the year.

II

Major Concepts

A. Chemistry is the science that deals with matter and the changes which matter undergoes.

1. All matter is made up of atoms.

2. The simplest kind of matter is an element.

3. All atoms in an element are alike.

4. Atoms of different elements differ.

5. Symbolic expressions are used in chemistry.

6. A single symbol represents an element.

7. Matter is anything that has weight and takes up space.

B. A poison through its chemical action may kill, injure or impare an organism.

1. Many familiar things are poisonous if incorrectly handled.

2. Some plants, animals and minerals are poisonous.

3. Some things are poisons at some times and beneficial in other situations.

C. A great amount of planning goes into a well presented project.

1. Many benefits are derived from group participation.

2. It is beneficial to learn of the capabilities of others.

D. Electricity is useful to man.

1. Electricity and magnetism are similar in several ways.

2. Electric motors change electrical energy into mechanical energy.

E. By using machines, people can make their work easier.

1. Simple machines are machines that have few or no moving parts.

2. The inclined plane is an example of a simple machine.

3. A wedge is a simple machine used to split things.

4. Complex machines are machines that are made up of two or more of the simple machines.

5. A ramp is a machine that can be used to move things up and down.

6. A wedge is two ramps placed back to back.

7. Ramps do not have to be straight. They can wind in different ways.

F. Man has learned many ways of making light because we need light to see things.

1. Some things shine because they give out light, but most things are seen because they reflect light.

2. A prism can be used to separate white light into many colors of which white light is made.

3. A rainbow is formed when drops of water act like millions of tiny prisms separating the white sunlight into the many colors.

G. Light is a form of energy.

1. Light has given characteristics.

2. Light will cast a shadow.

3. Light can go through some materials; light may partially go through some materials.

H. The kind of sound we get depends upon how fast the object moves.

1. The kind of sound we get depends on how tight the article is stretched.

2. A material substance is needed before sound can travel.

3. Sound travels in waves.

4. Sound waves can be directed or reflected.

5. Sound waves are received by the ear.

6. Messages set up by sound waves are sent to the brain.

7. Your ability to hear depends upon the condition of your ears.

I. Mississippi's state flower is the magnolia.

1. Mississippi has one of the most beautiful flowers in the world for her state flower.

2. The state of Mississippi has beautiful flowers.

J. All science is interrelated.

III

Experiences

A. Lesson Twenty Two

1. Have the students name various things in the classroom and tell whether or not they are solid, liquids, or gases.

2. Have the students list all the liquids they can think of.

3. Have a pupil report concerning the burning of the dirigible Hindenburg.

4. Have a display of as many elements as the students are able to bring in and identify.

B. Lesson Twenty Three

1. Ask the local druggist to speak to the children about poisons.

2. Make a list of household poisons.

3. Look for poison warnings on labels of food and drugs.

4. List the names of plants and their parts that are poisonous.

C. Lesson Twenty Four

1. Let the children demonstrate their project.

2. Watch special science programs on TV.

3. Visit the local Science Fair.

D. Lesson Twenty Five

1. Find out the materials that can be used to conduct an electric current well.

2. Make an electroscope.

3. Visit a power plant.

4. Visit your electrical plant.

5. Ask a qualified speaker to speak to the class concerning electricity.

E. Lesson Twenty Six

1. Visit a dam to watch the power being converted.

2. Make a list of the electrical appliances in your home.

D. Lesson Twenty Seven

1. Place many colors adjoining, place on a pencil and spin. Observe blended color.

2. Combine various water colors to see the resulting color.

3. Combine various colored glass over one another to observe the color the light produces.

4. Permit light to pass through different colored glass and permit it to fall on different colored materials. Keep a record of the colors produced.

5. Develop posters with pictures showing things which are sources of light.

E. Lesson Twenty Eight

1. Experiment with small wires by making the length of the wire vary and observing the differences in the sound when the wire is made to vibrate.

2. Experiment with certain materials to find out which carries the sound waves the best.

3. Compare the vibrating drum top with your eardrum.

F. Lesson Twenty Nine

1. Think of some of the motors we have in the kitchen; in toys; in the car; in the home workshop; elsewhere in the home.

2. Make a list of all the ramps in the school.

3. List the number of machines in the classroom. Which simple machines do they represent?

4. Make a set of machines to illustrate the inclined plane class.

G. Lesson Thirty

1. Visit a magnolia tree.

2. Prepare a bulletin board of the magnolia tree.

3. Make a list, with pictures to accompany, of the close relatives of the magnolia tree.

4. Display the leaves, burrs and flower, if in bloom, of the magnolia tree.

H. Lesson Thirty One

1. Evaluate the work for the year by displaying materials made or accumulated.

2. Ask the students questions concerning the best ideas presented.

LESSON TWENTY TWO

I. CONCEPTS

A. Many elements have been discovered and were usually named for the discoverer.

B. The atom is a particle of matter.

II. OBJECTIVES

A. To acquaint the student with an understanding of matter.

B. To create an interest in the smaller particles of matter.

C. To cause the student to be aware of the composition of matter.

D. To help children to be conscious or aware of the many different kinds of materials around us.

E. To acquaint children with the work of the chemist - how he studies the different kinds of matter, learns what things are made of, and finds out how to make new materials by putting familiar ones together in new and different ways.

F. Help children to appreciate man made products that are so familiar to us and that we take them for granted.

G. To cause the student to form some idea as to the meaning of the word element.

H. To cause the student to become interested in chemistry.

III. PROBLEM:

To learn the many different things matter contains.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. Chemistry, First Steps, Keith Irwin
2. The ABC's of Chemistry, Roy Gallant

3. Atoms for Junior, Les Landin
4. What is Chemistry?, Daniel K. Posin
5. What is Matter?, Daniel K. Posin
6. Elements of the Universe, Glenn T. Seaborg
7. Atoms and Molecules, Seymour Trieger

B. Films
1. Chemistry, Gateway
2. Wonders of Chemistry, YAF
3. The Air Around Us, EBF
4. Air and What It Does, EBF

C. Filmstrips
1. What Things Are Made Of, SVE
2. Atoms and Molecules, YAF
3. Air About Us, SVE
4. Atoms and Molecules, McGraw-Hill

LESSON TWENTY THREE
(Interrelated)

I. CONCEPT:

An understanding of materials can prevent many poison accidents.

II. OBJECTIVES

A. To familiarize the student with the many poisons we are associated with in our surroundings.

B. To cause an awareness of a need to follow instructions.

C. To learn that care must be taken in the handling and storing of household articles that are poisonous if used incorrectly.

III. PROBLEM:

. To learn how to prevent poisoning.

IV. INSTRUCTIONAL MATERIALS

A. FILMS

1. Children at Play with Poisons, Mississippi State Board of Health
2. Poisons In Your House, Mississippi State Board of Health

LESSON TWENTY FOUR
(Interrelated)

I. CONCEPT:

Every student that takes part in a group activity gains knowledge.

II. OBJECTIVES

A. To gain an opportunity for the students to display their scientific talent.

B. To offer an opportunity for the students to observe the work of their fellow students.

C. To encourage the students to take part in school projects.

D. To let the student become aware that a scientific display requires many skills.

E. To teach the students to follow rules and to encourage group activity.

III. PROBLEM:

To learn the rewards of scientific labor.

IV. INSTRUCTIONAL MATERIALS:

Books:

1. Experiments in Science, N. F. Deeler and F.M. Dranley
2. Science Projects You Can Do, George Stone
3. Experimental Physics Is for Young People, Alexander Efron
4. Experiments in Magnetism and Electricity, Harry Sooter
5. Research Adventures for Young Scientists, George Darr
6. Ideas for Science Fair Projects, Faucett Book 520
7. Science Fair Handbook, Mississippi Academy of Science

LESSON TWENTY FIVE

I. CONCEPT:

Frictional electricity is the phenomenon produced when a body becomes electrically charged because of an excess or a deficiency of electrons.

II. OBJECTIVES

A. To illustrate that electrons may be moved from one body to another by rubbing the two bodies together.

B. To cause the student to understand that a body with an excess of electrons is said to be negatively charged; one with a deficiency of electrons, positively charged.

C. To give an understanding that an electric current can be induced in a conductor by moving the conductor across magnetic lines of force.

D. To have an understanding of the ways static electricity is like current electricity and the ways the two are different.

E. To cause the students to learn ways that man uses static electricity.

F. To create an interest in the electrons.

III. PROBLEM:

To learn some of the characteristics of the electron.

IV. INSTRUCTIONAL MATERIALS

A. Books

1. Experiments with Electricity, Nelson Beeler and Franklyn Branley
2. First Electrical Book for Boys, A. P. Morgan
3. All About Electricity, Ira Freeman
4. The Night the Lights Went Out, Don Freeman
5. The Wonderful World Of Energy, Lancelot Hogben

6. Picture Book of Electricity, Jerome Meyer
7. Let's Find Out About Electricity, Herman and Nina Schneider
8. Boy and a Battery, R. F. Yates

B. Films
1. The Flow of Electricity, YAF
2. Talking Electricity, EBF
3. The Wonders of Electricity, EBF

C. Filmstrips
1. Electricity, SVE
2. Hot Water Produced Electricity, PDP
3. Frictional Electricity, YAF
4. Magnetism and Electricity, SVE

LESSON TWENTY SIX

I. CONCEPT

A. Electromagnets produce power in small amounts (door bell) or in great quantities (large motor).

B. Introduction --- Magnetism is intriguing to most students. With electromagnets, we can relate magnetism to the production of motion and power. We can lead the student through an understanding of straight-line motion (door bell) to an understanding of the production of rotary motions (motors).

II. OBJECTIVES

A. To gain an appreciation of the importance of electric power in our homes, industry, and farms.

B. To better understand electromagnetism and the production of motion.

C. To learn the principles of industry.

D. Using the principles taught above, to learn the principles of electric motors.

III. PROBLEM:

To increase the students knowledge of electricity.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. Electricity, Bertha Parker
2. More Power To You, Herman and Nina Schneider

B. Films
1. Electrical Safety in the Home, Mississippi State Board of Health
2. Electricity All About Us, Cor
3. Learning About Electric Current, EBF
4. Introduction to Electricity, Cor

LESSON TWENTY SEVEN

I. CONCEPT :

Most colored objects are the color they appear to be due to the light rays they reflect.

II. OBJECTIVES

A. To show the students that sunlight is a composite of many colors.

B. To let the students know the conditions that are necessary for rainbows to be formed.

C. They will learn the function of the prism and be able to understand a relationship between the prism and the raindrop.

D. To impress upon the student that the white light is made up of the colors of the rainbow.

III. PROBLEM :

To learn how colors are produced.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. The Adventure of Light, Frank Jupo
2. What Could You See?, Heanne Bendick
3. The First Book of Science Experiments, Rose Wyler
4. Experiments with Light, Nelson Beeler and Franklyn Branley

B. Films
1. Light and Heat, Gateway
2. Light and Shadow, YAF
3. Nature of Color, Cor
4. Color, EBF

C. Filmstrips
1. How Do We See and Hear?, Moody
2. Light, YAF
3. Light in Our Daily Lives, EGF
4. Light and Color, JH

LESSON TWENTY EIGHT

I. CONCEPT:

There are many different kinds of sounds.

II. OBJECTIVES

A. To learn what causes sound.

B. To learn how sound travels.

C. To learn how your ear receives sounds.

III. PROBLEM:

To create a better understanding of the characteristics of sound.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. Your Ears, Irvin and Ruth Adler
2. Sound, Henry Brinton
3. Sound, Charles D. Neal
4. Sound, Solveig P. Russell
5. We Read About Sounds and How They Are Made, Harold Tannenbaum and Nathan Stillman
6. Sounds You Cannot Hear, Eric Windle

B. Films
1. Sound for Beginners, Cor
2. What is Sound?, McGraw-Hill; YAF

C. Filmstrips
1. Sound Waves, SVE
2. Science At Work, EDF

LESSON TWENTY NINE

I. CONCEPT:

Simple machines of the inclined plane class are the wedge and the screw.

II. OBJECTIVES

A. To give the children an understanding of several kinds of simple machines.

B. To stimulate the children so they will conduct experiments with simple machines.

C. To increase the children's knowledge of simple machines of the inclined plane class.

III. PROBLEM:

To be able to explain the similarities between the inclined plane, the wedge, and the screw.

IV. INSTRUCTIONAL MATERIALS

A. Books
1. Tools in Your Life, Irving Adler
2. Engineers Did It, Duane Bradley
3. Machines, Bertha M. Parker
4. Now Try This, Herman and Nina Schneider
5. What's Inside of Engines, Herbert Zim

B. Films
1. Machines Do Work, YAF
2. Simple Machines, Inclined Planes, Cor
3. How Machines and Tools Help Us, Cor
4. Machines, Gateway
5. How Strong Can You Be, Journal

C. Filmstrips
1. Whys of Elementary Science Simple Machines, FH
2. Simple Machines Help Us Work, JH

LESSON THIRTY
(Interrelated)

I. CONCEPT :

The magnolia is the state flower of Mississippi.

II. OBJECTIVES:

A. To cause the students to have an awareness of the state flower.

B. To get the student to learn facts about his state flower.

C. To cause an interest and have pride in the things that belong to Mississippi.

D. To develop a curiosity about plants and a desire to learn about the magnolia tree.

III. PROBLEM:

To learn of the state flower of Mississippi.

IV. INSTRUCTIONAL MATERIALS:

Books
1. State Birds and Flowers, Olive L. Earle
2. Our State Birds, Mary I. Curtis
3. Mississippi: A History, John K. Bettersworth

B. Films
1. Development of Natural Resources In Mississippi MFI
2. Forest Attractions In Mississippi MFI
3. A Trip Through The Capital City MFI

LESSON THIRTY ONE
(Interrelated)

I. CONCEPT:

Evaluation is a necessary part of a program if progress is to proceed at its best.

II. OBJECTIVES:

A. To decide upon the better points of the year's work.

B. To decide upon the better methods of presentation of the facts given during the year.

C. To decide upon the best examples to be used to illustrate the subject.

III. PROBLEM:

To learn the better points of the program during the year.

BOOKS FOR TEACHERS

Asimov, Isaac, The New Intelligent Man's Guide to Science, New York: Basic Books, Inc.

Blough, Glenn O. and Julius Schwartz, Elementary School Science and How To Teach It, New York: Holt, Rinehart and Winston, 1964.

Blough, Glenn O. and Albert Huggett, Elementary School Science and How To Teach It, New York: The Dryden Press.

Blough, Glenn O., Julius Schwartz, and Albert J. Huggett, Elementary School Science and How To Teach It (Revised Edition), New York: Holt, Rinehart and Winston.

Carin, Arthur, and Robert Sund, Teaching Science Through Discovery, Columbus, Ohio: Charles E. Merrill Books, Inc.

Craig, Gerald S., Science for the Elementary School Teacher, Boston: Ginn and Company, 1958.

Croxton, W. C., Science in the Elementary School, New York: McGraw-Hill Co., Inc.

Hone, Joseph and Victor, Teaching Elementary Science: A Source-book for Elementary Science, New York: Harcourt, Brace and World, Inc.

Navarra, John Gabriel and Joseph Zafforoni, Science Today for the Elementary School Teacher, New York: Harper & Row, 1963.

Tannebaum, Harold E., Nathan Stillman, and Albert Piltz, Science Education for Elementary School Teachers, Boston: Allyn and Bacon, Inc.

Victor, Edward, Science for the Elementary School, New York: Macmillan, 1965.

SUPPLEMENTARY MATERIALS

Aids for Health Teaching -
Health and Welfare Division
Metropolitan Life Insurance Company
1 Madison Avenue
New York, New York 10010

Algae in Water Supplies -
U. S. Public Health Series Service Publication No. 657
U. S. Printing Office
Washington D. C. 20402 price $1.00

"Inside the Atom" -
Educational Relations Department
M W H General Electric Co.
Schenectady 5, New York

Periodic Chart of the Elements -
Merck and Company
Rahway, New Jersey

Secure a card from the Bureau of Pharmaceutical Services telling how the public should deal with poison cases.
Bureau of Pharmaceutical Services
School of Pharmacy
University of Mississippi

Free classroom game, "Ring the Bell" -
Breakfast Game
Kellogg Company
Home Economics Services
Department 19-65
Battle Creek, Michigan 49016

"Working with Science" -
Department of Education
Jackson, Mississippi

List of Approved Materials for Elementary Science -
Department of Education
Jackson, Mississippi

"Let's Collect Rocks" -
"Let's Collect Shells" -
Shell Oil Company
P. O. Box 60193
New Orleans, Louisiana 70160

FILM AND FILMSTRIP COMPANIES

AIF	Almanac Films, Inc. 519 Fifth Avenue New York 18, New York
Barr	Arthur Barr Productions 6211 Arroyo Glen Los Angeles 42, California
CM	Churchill-Wexler Film Productions 801 North Seward St. Los Angeles 38, California
Cor	Coronet Films Coronet Building Chicago 1, Illinois
Bired	Bired Corporation 35 West 53rd St. New York 19, New York
EBF	Encyclopaedia Britannica Films 1150 Willmette Ave. Willmette, Illinois
IF	Instructional Films, Inc. 1150 Willmette Ave. Willmette, Illinois
Pictorial	Pictorial Films, Inc. 1501 Broadway New York 19, New York
Sterling	Sterling Films, Inc. 6 East 39th St. New York, New York

YAF	Young America Films, Inc. 19 East 41st St. New York 17, New York
Curr F	Curriculum Films American Educational Projections Corporation 1319 Vine St. Philadelphia, Penn.
EGH	Eye Gate House, Inc. 2716 41st St. Long Island City 1, New York
FH	The Filmstrip House 347 Madison Ave. New York 17, New York
CS	Charles Scribner's Sons Educational Dept. 597 Fifth Ave. New York 17, New York
KB	Knowledge Builders Visual Education Center Building Floral Park, New York
JH	Jam Handy Organization 2821 East Grand Boulevard Detroit 11, Michigan
PDP	Pat Dowling Pictures 1056 South Robertson Boulevard Los Angeles 35, California
SVE	Society for Visual Education, Inc. 1345 West Diversey Parkway Chicago 14, Illinois
UW-Educ	Educational Film Department United World Films, Inc. 1445 Park Ave. New York 29, New York

Cyanamid	American Cyanamid Co. Lederle Laboratories Division Pearl River, New York
Bailey	Bailey Films, Inc. 6509 De Longpre Ave. Hollywood 28, California
Bray	The Bray Studios, Inc. 729 Seventh Ave. New York 19, New York
FAC	Film Associates of California 10521 Santa Monica Boulevard Los Angeles, California 90025
Cenco	Cenco Educational Films 1700 Irving Park Road Chicago, Illinois 60613
PS	Popular Science Publishing Co. Audio-Visual Division 353 Fourth Ave. New York 10, New York
NAS	National Audubon Society 1130 Fifth Ave. New York 28, New York
IBF	International Film Bureau 57 East Jackson Boulevard Chicago 4, Illinois
NET	National Educational Television Film Service Indiana University Bloomington, Indiana
Moody	Moody Institute of Science 11428 Santa Monica Boulevard Los Angeles 25, California

TFC	Teaching Film Custodians, Inc. 25 West 43rd St. New York 36, New York
WLF	Wild Life Films 5149-5151 Strolm Ave. North Hollywood, California
MFI	Mississippi Filmstrip, Inc. Box 165 Natchez, Mississippi
VS	Visual Sciences Box 599-HW Suffern, New York
Photo Lab	Photo Laboratory, Inc. 3825 Georgia Ave., N.W. Washington, D. C.

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